E/CONF.39/C/445
2 Nov.1962
ORIGINAL : ENGLISH

UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

Agenda Item: C.7.1

United States of America

FORESTRY'S CONTRIBUTION TO A PERMANENT AGRICULTURE

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INTRODUCTION

1. In a world where hunger remains an unsolved problem, and where the need for assured food production becomes more insistent with the passing years, few nations can neglect whatever measures may contribute to a permanently productive agriculture and to adequate living standards for their rural population.

2. The fate of a nation's agriculture is seldom decided in the croplands alone. Factors far removed from the farm may play a major role. Thus the condition and permanence of an agricultural economy may, in very large degree, be governed by the protection afforded to the often-distant upland soils. Erosion, destructive floods, loss of top soil, and water failure may have to be dealt with in establishing a permanent agricultural economy. These age-old enemies are still an ever-present menace to food production, but they can be curbed by a vegetative cover of grass or trees. Grass provides valuable protection against the erosive effects of rain and wind but has the disadvantage of being susceptible to fire and to destruction by grazing animals. Forests are generally the more effective, and throughout history have proven to be staunch allies of agriculture in many diverse ways.

3. In a nation's use of land, forestry and agriculture share the same objective,--the most efficient management of the soil for human good. Only when the two are seen as interlocking, mutually-sustaining measures can land use be envisaged as a whole, or can the richest returns from agriculture be hoped for. Forestry and agriculture combine to form an essential way of transforming soil fertility into the raw materials man requires. Their techniques and time factors may differ widely, but both agriculture and forestry have to do with growing crops, and both play primary roles in man's dealing with the soil. The very term "farm forest" implies this integration.

4. A planned relationship between agriculture and forestry increases their mutual effectiveness and helps to advance the prosperity of the farmer who, in many countries, is both a forest worker and forest owner.

5. The critical importance of forests to agriculture is still far from recognized by all agricultural planners. As a consequence, thousands of farms have failed to maintain or even reach satisfactory productive standards and thousands of hectares of once-irrigated croplands have been lost to the invading desert.

6. This paper is an effort to point out the intimate relationship that forests bear to a balanced agriculture. It is to suggest how their protective influences may be enhanced and how their economic potential may contribute to the living standards of a nation's rural population. It is directed primarily to countries formulating or expanding their agricultural programs, to the end that forestry may bring to a farm economy the stability that can best come from an integrated use of agricultural and forest soils.

PROTECTION FORESTS

7. Forests serve agriculture in two ways,--as a protection of soils and crops and as a permanent source of many farm essentials. For this reason they have been designated "protection forests" and "production forests" depending on their function, although actually most forests serve both purposes. However, when one objective clearly outweighs the other, forest management is directed toward the major goal.

8. Protection against erosion and destructive waterflow is usually the chief function of the forests in the higher regions where shallow soil and steep slopes make the land unstable. Through the centuries, these forests have attained an equilibrium that enables them to endure and hold the soil in place, but this equilibrium is extremely delicate and any disturbing force--such as fire or widespread cutting--can easily destroy its protective value. Once destroyed, it may never be regained.

9. Where agriculture depends on irrigation, the need to stabilize the upland soil is even more critical. Vast funds have been wasted on the construction of costly irrigation reservoirs and canals which were soon rendered useless by the deposit of silt. The best insurance for permanence of these installations and for a continued supply of water is a forest cover to hold the soil in place, to check the destructive violence of storms, and to conserve every available drop of moisture for use in the croplands below.

10. Forests and Floods: No responsible forester would say that forests can prevent floods. If sustained rainfall is heavy enough, neither trees nor grass nor any vegetative cover can absorb all the water, and in that event floods may result. But forests can absorb vast quantities of water and greatly reduce both flood volume and destructiveness. Peak flows from forested areas rarely exceed 60 second-feet per square mile, while from denuded or eroded land, they often exceed 1,000 feet.

11. A forest cover not only increases the power of the soil to absorb large quantities of water, but it reduces debris and sediment and the vast amounts of silt which augment a flood's volume and violence. It is hard to conceive of the amount of solid material that can be carried by floodwaters rushing down bare or denuded hillsides. Sixty percent or more of the flood's total volume may be composed of solid substances and it is this material which, if deposited on arable lands, can destroy them. Eliminate this, and the destructiveness of the flood will be vastly reduced and its menance to croplands minimized. There is this dual protection, then, which forests provide to agriculture,--reducing the volume of floodwaters and curtailing the accumulation of sediment and debris. From a farmer's standpoint, the deposit of mud and debris may be far more destructive than the water itself.

12. Forests and Farm Water Supply: The effect of trees upon the conservation of water supplies has been too completely documented to need any lengthy discussion. It is well known that waters emerging from forested areas are usually clear and that the flow of water itself tends to be equalized, avoiding both wasteful peak periods and periods of water failure.

13. No matter what tree species compose it, a forest stores a greater amount of precipitation than any other vegetative cover. The litter of leaves, twigs and branches that collect on the forest floor vastly increases the permeability of the soil and allows greater amounts of water to soak in than does a bare earth surface.

This water, sinking into the soil, later takes the form of ground water or becomes the source of springs and is not lost in swift and often-destructive surface flow. Forests, then, increase underground storage water much more than a bare surface or one scantily covered with vegetation. Forests, in a word, tend to maintain a steady flow of water in the streams and to increase the reservoirs of ground water, without which many agricultural communities would find it difficult to endure.

14. Windbreaks and Shelterbelts: Trees are more than protectors of agricultural soil and guardians of agriculture's water supply. From very early times, they have been found effective in shielding crops and farm animals against the hot, drying winds of summer and the freezing gales of winter. Thousands of hectares have been planted to trees for these purely agricultural purposes and such planting usually takes the form of windbreaks or shelterbelts.

15. The broad function of both is the same--protection against the wind. The "windbreaks" usually refers to one, two or three rows of trees whose purpose is the local protection of farm crops from soil movement and the drying effects of wind. Shelter-belts are wider and often of great length and their establishment is ordinarily beyond the resources of the individual farmer and requires the assistance of government. Governmental action and support made possible the thousands of miles of shelterbelts that today protect millions of acres of Russian farmlands. The mile after mile of tree strips in Jutland, without which farming would be impossible, was a governmental enterprise. In Roumania the protection afforded by trees in the farmers' battle against erosion and drought is largely responsible for the continuous production of agricultural crops and for maintaining the living standards of the population. In parts of the United States it is almost useless to grow fruit without windbreaks, and both the quality and quantity of fruits and vegetables have greatly increased when protected by trees. Added to all this are the very tangible benefits of reduced fuel costs and of making the farm homestead more livable, both winter and summer.

16. Establishing windbreaks in agricultural communities is not difficult, but three steps are essential: (1) adequate preparation of the site to be planted; (2) careful planting of hardy tree species, preferably of local origin or proven to be locally successful; and (3) thorough cultivation in the early stages.

PRODUCTION FORESTS

17. Added to the purely protective values of forests is their value as perpetual sources of materials required in an agricultural economy. Here, forests are essential to continuous wood production, and it is here, too, that forestry and agriculture are interdependent economically and are mutually self-sustaining. Work in the woods helps many a farm community financially, and these farm communities in turn create markets for wood industries and provide manpower for logging operations. Work in the forests enables a farmer to utilize his time profitably during seasons of slack agricultural activity and constitutes an important contribution to the stability and standards of rural living.

18. When farm communities have ready access to woodlands, the entire pattern of life is in striking contrast to that of communities living under a chronic regime of wood famine. It is not generally recognized that firewood is one of the world's most important agricultural crops; yet fuel is indispensable, and where wood cannot be obtained, as in the Upper Ganges Plain of India, the farmer is forced to burn cattle dung and agricultural refuse which should go to maintain soil fertility. The time and effort consumed in gathering fuelwood

from distant woodlands represents a staggering loss of agricultural manpower--a loss that could be eliminated by devoting the less fertile, non-agricultural portion of the farm to trees.

19. Wood is not only a spare-time crop. It is a poor-land crop, growing on soils too rugged or too sterile for raising food. Farm woodlands, while still exercising a protective function, may make profitable the use of land a farmer cannot gainfully cultivate for crops. From them he realizes needed products and often a cash income. Fuel, fence posts, material for houses and barns, food for livestock,--all these offer the farmer direct opportunities for cash savings. In times of crop failure, the merchantable material in a farm woodland may prove a welcome buffer against financial disaster.

20. In parts of England, where agricultural work alone, or forest work alone, may not suffice to support a family, planned coordination between forestry and farming has made settlement possible and brought about a stabilized, prosperous existence. Again, in the semi-desert area of southwest India, where land has been placed under irrigation, sections are specifically set aside for forest plantations to meet the woods needs of the farmer.

21. This integration of agriculture and forestry in many parts of the world has brought a stability and abundance to human living that neither agriculture nor forestry alone could achieve. But it does require planning, and often it requires governmental leadership. Certainly, a basic function of government lies in raising the living standards of its people, and in an agricultural community the integrated use of a nation's arable and forest soils is a definite step toward that goal.

DEVELOPING FARM FOREST VALUES

22. In planning an agricultural economy, many nations have found that to include a definite policy for their forest lands helps to insure permanent food-crop production and creates a source of steadily increasing values on their non-arable soils.

23. No country can be said to have a comprehensive land-use policy until it has decided what part its forests and forest soils can play in both agricultural and industrial development. Thus, in seeking a balanced economy, a nation may be faced with the need to convert part of its tree-covered land to agriculture or, on the other hand, to establish tree plantations and increase its forested areas in the interests of soil protection and wood production. In any case, a national policy should direct itself to decisions as to the functions of their forests and forest soils in the major categories of production and protection.

24. Specific requirements will dictate which objective is paramount. In critical areas, the need for soil protection may be so urgent that little or no tree-cutting is advisable. In other situations, the forest may be managed purely to provide the maximum amount of fuel or other wood products. In any case, intelligent planning demands that the lands of a nation be broadly classified as to their suitability for agricultural use and forest use; and, where the forest contains extensive commercial values, that an inventory be made of its contents.

25. Land Classification: In many regions, there exists a profound misconception of what constitutes true agricultural soil, and the world is dotted with abandoned hectares following attempts to force non-agricultural lands to produce permanent food crops. In North and South America, millions of hectares of once-cultivated land have been ruined by erosion because they were not adaptable to agriculture.

In the Philippines any patch of earth capable of producing two or three meager crops is considered agricultural by the "pioneer" farmer, and thousands of hectares have been denuded of forests in misguided attempts to convert the land to agriculture, only to find it unfit for any growth but trees.

26. The fact that an area may support heavy, luxuriant forests but be valueless for food crops is one of the most costly paradoxes in the history of agriculture. These soils appear so abundantly fertile that it is difficult to believe they may be inhospitable to any form of vegetation but trees. Actually, the fertility that sustains the forests lies in the tree itself. The soil is often little more than a foothold for roots and a passageway for nutrients. The fertility derives from the rapid decomposition of leaves and forest litter, returning to the living tree in a kind of closed cycle. When the land is cleared for agriculture, in only a short while the soil is totally unfit for food crops. After brief cultivation, the land is abandoned, the soil having lost what little vitality it once possessed. Some tropical soils are particularly fragile. Once the forest cover is destroyed, the baking sun soon converts the earth's surface to a hard, brick-like substance incapable of supporting even the scantiest vegetation.

27. Farm Forests: In many parts of the world, farm forests comprise the largest area and represent the highest values of a nation's timberlands; yet the average farmer falls far short of bringing to the management of his woodlands the same degree of skill that he brings to his food crops, and when he sells the products of his farm forest, he seldom receives their full value. It is in this dual field of forest management and merchandising that governments can be of practical aid by furnishing the farmer with information and technical assistance. Many countries employ a specialized type of forester known as the "farm forester," trained in the management and the merchandising of farm woodlands. He works directly with the farmer, recommending the proper protective and cutting methods, assisting in selecting trees to be cut, and advising on marketing methods.

28. Forest Research and the Farmer: With a nation's development, the position of the farmer as a forest owner becomes progressively more important. His forests are usually more accessible and occupy more fertile soils than industrial forests, and hence good management yields rich returns. To develop improved practices can be a major objective of any agricultural program where the potential value of farm forests is a significant factor.

29. These improved practices may be arrived at by the slow and often costly road of trial and error, but a far better way lies in research planned directly toward the solution of farm-forest problems and toward increasing their productive and protective values. Pilot tests, for example, can provide the farmer with established facts before he spends time and money on ventures of questionable value. Tests will tell him what tree species are most desirable from the standpoint of survival and rapidity of growth. They will tell him what species are best for special needs.

30. Investigations of this type are usually beyond the financial means of the individual farmer, and it becomes a responsibility of government to assume leadership in this rewarding field. Tests of exotic species that promise to be well-adapted to farm needs, tests of structural characteristics, tests of species most suitable for windbreaks, soil retention and a host of other purposes can best be made by government. In the United States it is a joint Federal-State responsibility to see that the benefits of scientific advancement in forest management and utilization are made available to the small woodland owner. Funds devoted to research of this kind have proven to be among the best investments a government can make in seeking a stable and permanent agriculture.

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